

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1 1-10. (Canceled)

1 11. (Currently Amended) A self-pinned abutted junction magnetic read
2 sensor, comprising:
3 a free layer for sensing magnetic fluxuations;
4 first hard bias layers abutting the free layer; and
5 second hard bias layers, formed over the first hard bias layers ~~discontiguous~~
6 discontiguous from the free layer, ~~the~~ a magnetization of the second hard bias layers
7 being anti-parallel to ~~the~~ a magnetization of the first hard bias layers, the first and second
8 hard bias layers providing a net longitudinal bias on the free layer.

1 12. (Original) The sensor of claim 11, wherein the first hard bias layers is
2 formed with a thickness substantially equal to a thickness of the second hard bias layers.

1 13. (Original) The sensor of claim 11, wherein the first hard bias layers is
2 formed with a thickness greater than a thickness of the second hard bias layers.

1 14. (Original) The sensor of claim 11 further comprising interlayers
2 disposed between the first and second hard bias layers.

1 15. (Original) The sensor of claim 11 further comprising a self-pinned
2 layer, the self-pinned layer having a first end, a second end and central portion, wherein
3 the central portion is aligned with the free layer and the first hard bias layers are formed
4 over the first and second ends of the self-pinned layer.

1 16. (Original) The sensor of claim 15 further comprising a spacer layer
2 formed over the self-pinned layer and a first and second seed layer formed between the
3 first and second hard bias layer and the spacer layer.

1 17. (Original) The sensor of claim 16 further comprising amorphous
2 layers formed between the spacer and the first and second seed layers, the amorphous
3 layer stopping epitaxial growth between the self-pinned layer and the first and second
4 hard bias layers.

1 18. (Original) The sensor of claim 15 further comprising amorphous
2 layers formed between the self-pinned layer and the first and second hard bias layers for
3 stopping epitaxial growth between the self-pinned layer and the first and second hard bias
4 layers.

1 19. (Original) The sensor of claim 11 further comprising first and second
2 leads formed over the first and second hard bias layers.

1 20. (Original) The sensor of claim 11, wherein the free layer further
2 comprises a length selected for a desired track width.

1 21. (Currently Amended) A magnetic storage system, comprising:
2 a moveable magnetic storage medium for storing data thereon;
3 an actuator positionable relative to the moveable magnetic storage medium; and
4 a magnetoresistive sensor, coupled to the actuator, for reading data from the
5 magnetic recording medium when position to a desired location by the actuator, wherein
6 the magnetoresistive sensor further comprises:
7 a free layer for sensing magnetic fluxuations;
8 first hard bias layers abutting the free layer; and
9 second hard bias layers, formed over the first hard bias layers
10 ~~discontiguous~~ discontiguous from the free layer, ~~the~~ a magnetization of the second hard
11 bias layers being anti-parallel to ~~the~~ a magnetization of the first hard bias layers, the first
12 and second hard bias layers providing a net longitudinal bias on the free layer.

1 22. (Original) The magnetic storage system of claim 21, wherein the first
2 hard bias layers is formed with a thickness substantially equal to a thickness of the
3 second hard bias layers.

1 23. (Original) The magnetic storage system of claim 21, wherein the first
2 hard bias layers is formed with a thickness greater than a thickness of the second hard
3 bias layers.

1 24. (Original) The magnetic storage system of claim 21 further
2 comprising interlayers disposed between the first and second hard bias layers.

1 25. (Original) The magnetic storage system of claim 21 further
2 comprising a self-pinned layer, the self-pinned layer having a first end, a second end and
3 central portion, wherein the central portion is aligned with the free layer and the first hard
4 bias layers are formed over the first and second ends of the self-pinned layer.

1 26. (Original) The magnetic storage system of claim 25 further
2 comprising a spacer layer formed over the self-pinned layer and a first and second seed
3 layer formed between the first and second hard bias layer and the spacer layer.

1 27. (Original) The magnetic storage system of claim 26 further
2 comprising amorphous layers formed between the spacer and the first and second seed
3 layers, the amorphous layer stopping epitaxial growth between the self-pinned layer and
4 the first and second hard bias layers.

1 28. (Original) The magnetic storage system of claim 25 further
2 comprising amorphous layers formed between the self-pinned layer and the first and
3 second hard bias layers for stopping epitaxial growth between the self-pinned layer and
4 the first and second hard bias layers.

1 29. (Original) The magnetic storage system of claim 21 further
2 comprising first and second leads formed over the first and second hard bias layers.

1 30. (Original) The magnetic storage system of claim 21, wherein the free
2 layer further comprises a length selected for a desired track width.

1 31. (Currently Amended) A self-pinned abutted junction magnetic read
2 sensor, comprising:
3 first means for sensing magnetic fluxuations;
4 first bias means abutting the first means on opposite sides of the first means; and
5 second bias means, formed over the first bias means ~~discontinguous~~ discontiguous
6 from the first means for sensing magnetic fluxuations, ~~the~~ a magnetization of the second
7 bias means being anti-parallel to ~~the~~ a magnetization of the first bias means, the first and
8 second bias means providing a net longitudinal bias on the first means for sensing
9 magnetic fluxuations.

1 32. (Currently Amended) A magnetic storage system, comprising:
2 a moveable magnetic storage means for storing data thereon;
3 an actuator positionable relative to the moveable magnetic storage medium; and
4 a magnetoresistive sensor, coupled to the actuator, for reading data from the
5 magnetic recording medium when position to a desired location by the actuator, wherein
6 the magnetoresistive sensor further comprises:
7 first means for sensing magnetic fluxuations;
8 first bias means abutting the first means on opposite sides of the first
9 means; and
10 second bias means, formed over the first bias means ~~discontiguous~~
11 discontiguous from the first means for sensing magnetic fluxuations, ~~the~~ a magnetization
12 of the second bias means being anti-parallel to ~~the~~ a magnetization of the first bias means,
13 the first and second bias means providing a net longitudinal bias on the first means for
14 sensing magnetic fluxuations.